Guide to Microsoft® Windows 2000® Core Technologies

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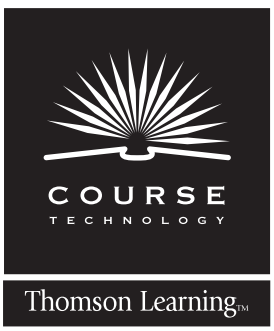

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Brief Contents

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Preface

Introduction

Welcome to *Guide to Microsoft Windows 2000 Core Technologies*! This book offers you real-world examples, interactive activities, and hundreds of hands-on projects that reinforce key concepts and help you understand the underlying components of Windows 2000. This book also features troubleshooting tips for solutions to common problems that you will encounter in the realm of Windows 2000 administration.

This book offers in-depth study of all the salient functions and features of installing, configuring, and maintaining Windows 2000 Server. Throughout the book, we provide pointed review questions to reinforce the concepts introduced in each chapter. In addition to the review questions, we provide detailed hands-on projects that let you experience first hand the processes involved in Windows 2000 configuration and management. Finally, to put a real-world slant on the concepts introduced in each chapter, we provide case studies to prepare you for situations that must be managed in a live networking environment.

The Intended Audience

This book is intended to serve the needs of those individuals and information systems professionals who are interested in learning more about Microsoft Windows 2000, as well as individuals who are interested in obtaining Microsoft Windows 2000 certification.

Chapter 1, "What Is an Operating System?," introduces the basic principles that govern the design of an operating system and explains the fundamental roles that an operating system must play. In addition, it addresses how an operating system works with hardware and other software and enables users to access a computer's services and resources. It also teaches you how to recognize the key components that make up an operating system and how they relate to one another, as well as provides an overview of the various Windows 2000 family members.

In **Chapter 2**, "Examining the Parts of an Operating System," we discuss the purpose of operating systems, list the parts of a modern operating system, and explain how the pieces of an operating system relate to one another. In addition, we describe the difference between kernel mode and user mode and explain why there's a difference and relate this information to the Windows 2000 architecture.

In **Chapter 3**, "Key Windows 2000 Components," we recount the basic startup process for Windows 2000 and provide an overview of the Windows 2000 Registry. In addition, we describe the Windows 2000 base functionality so that you can recognize and use the basic administrative tools included with Windows 2000.

In **Chapter 4**, "Allocating and Managing Operating System Resources," we explain what applications, processes, and threads are and how they fit together, and provide you with the information needed to understand how different server types have different priorities. In addition, we explain how memory management works. Finally, we list the kinds of objects found in Windows 2000 and explain how Windows 2000 object-level security works so that you may better understand the role of the object manager in Windows 2000.

Chapter 5, "Hardware and Device Management in Windows 2000" discusses the differences between hardware and devices, and how the operating system manages devices and resource allocation. We also examine how devices communicate with the CPU and other system resources. In addition, we list the four components of hardware management in Windows 2000 and how they interact. We conclude this chapter with a discussion of how the new Win32 Driver Model (WDM) fits into the Windows 2000 architecture and provide information on Windows 2000's support for Power Management, the OnNow system, and hardware devices and system buses.

Chapter 6, "Data Storage," explains how physical disks are organized, describes how Win2K reads disks to circumvent the logical limit to partition size, and explores how the physical structure of a hard disk relates to its logical organization. Additionally, we list the types of volumes supported by Windows 2000 and discuss the role of a file system in an operating system. Finally, we describe the features of each file system that Windows 2000 supports, and examine the advanced features of NTFS.

Chapter 7, "Storage Management," explores how data is managed in Windows 2000. This discussion includes how to create and manage basic and dynamic disks using Windows 2000 disk management tools. In addition, we explore the different Windows 2000 volumes, including simple, spanned, striped, mirrored, and RAID 5 volumes, as well as how to recover from failed mirrored and RAID 5 volumes in Windows 2000. Finally, we show you how to assign quotas for all users and for individual users. We also discuss how to upgrade a basic disk to a dynamic one, and extend an NTFS volume to include extra disk space.

In **Chapter 8**, "Networking Basics," we examine the seven layers of the OSI model, the role of protocols and services in networks, and how those protocols are based on this networking model. Finally, we explain the differences between a normal operating system and a network operating system and list the differences between client and server roles.

Chapter 9, "Network Identification," takes a look at the naming protocols used in Windows 2000 Server, as well as how to configure the Microsoft Domain Name Service (DNS) for Windows 2000 Server. Additionally, we discuss how to install and manage the

Microsoft Windows Internet Name Service (WINS) for Windows 2000 Server. We also show you how to assign TCP/IP addressing information to your clients dynamically using the Microsoft Dynamic Host Configuration Protocol (DHCP) service for Windows 2000 Server and create DHCP scopes, Superscopes, and Multicast Scopes. We conclude this chapter with a discussion of the basic concepts of TCP/IP subnets and domains.

In **Chapter 10**, "Organizing Network Resources," we explore the differences between an Active Directory domain and a Windows NT domain, and explore Active Directory organizational units, domains, trees, and forests, as well as how to maintain and control the Active Directory. We also explore how Active Directory maintains its files and logs, how to complete a backup of the Active Directory, as well as recover and restore the Active Directory in case of failure.

Chapter 11, "Sharing Network Resources," explores resource sharing and the steps necessary to share resources, files, folders, and printers on a Windows 2000 Server. We also discuss IntelliMirror and the software installation and maintenance features. This chapter also examines how to install and configure Internet Information Services for sharing Web resources, as well as how to install and configure Windows 2000 Terminal Server.

Chapter 12, "Securing Network Resources," explains how an operating system and applications are licensed. We also tell you how to edit the rights and permissions associated with groups, or create your own groups with special rights and explain the various methods of user authentication available in Windows 2000. Finally, we explore how to distinguish policies and profiles and explain how each are used in Windows 2000 and discuss the encryption methods employed by Windows 2000.

Chapter 13, "Fault Tolerance," defines the parts of an operating system that make it fault tolerant and explains how the various kinds of backup operations work. We also list the backup media supported by Windows 2000 and explain what RAID is and how the various forms of RAID supported by Windows 2000 contribute to its fault tolerance. This chapter concludes with a discussion of clustering and how it works.

Chapter 14, "Disaster Recovery Mechanisms," describes what happens during the Windows 2000 boot process. In addition, we explore how the tools in the Advanced Option menu work to repair a damaged operating system and define how the Emergency Repair Disk and the Recovery Console can recover Windows 2000 settings or fix a problem. Finally, we explain how the restoration process works to restore a server back to its original condition.

This book concludes with **Chapter 15**, "Troubleshooting Windows 2000." Here, we show you how to troubleshoot general problems with Windows 2000, introduce you to some of the troubleshooting tools of Windows 2000, and examine how to work with advanced boot options. We also discuss how to troubleshoot the Windows 2000 Registry, back up data and settings, and recover a Windows 2000 Professional client's applications and data. We conclude

with how to create and use an Emergency Repair Disk, and install and use the Recovery Console. We also describe remote operating system installation and how it can be used with IntelliMirror to recover an entire PC remotely.

Additionally, the **Appendix**, "Windows Scripting Host," discusses how to handle scripting in Windows 2000 using two scripting tools: the DOS-based Cscript.exe and the Windows-based Wscript.exe.

FEATURES

Many features in this book are designed to improve its pedagogical value and aid you in fully understanding Windows 2000 concepts.

- **Chapter Objectives** Each chapter begins with a detailed list of the concepts to be mastered within that chapter. This list provides you with a quick reference to the contents of the chapter as well as a useful study guide.
- **Illustrations and Tables** Numerous illustrations of networking components help you visualize common networking setups, theories, and architectures. In addition, tables provide details and comparisons of both practical and theoretical information.
- **Chapter Summaries** The text of each chapter concludes with a summary of the concepts it has introduced. These summaries provide a helpful way to recap and revisit the ideas covered in each chapter.
- **Key Terms** Following the summary, a list of new networking terms and their definitions encourages proper understanding of the chapter's key concepts and provides a useful reference.
- **Review Questions** End-of-chapter assessments begin with a set of review questions that reinforce the ideas introduced in each chapter. These questions not only show you whether you have mastered the concepts, but are written to help prepare you for the Microsoft certification examination.
- **Hands-on Projects** Although it is important to understand the theory behind networking technology, nothing can improve upon real-world experience. Each chapter provides a series of exercises aimed at giving students hands-on implementation experience.
- **Case Projects** Finally, each chapter closes with a section that proposes certain networking situations. You are asked to evaluate the situations and decide upon the course of action to be taken to remedy the problems described. This valuable tool will help you sharpen your decision-making and troubleshooting skills, which are important aspects of network administration.

TEXT AND GRAPHIC CONVENTIONS

Wherever appropriate, additional information has been added to this book to help you better understand what is being discussed in the chapter. Icons throughout the text alert you to additional materials. The icons used in this book are described here:

Tips give extra information on how to attack a problem, time-saving shortcuts, or what to do in certain real-world situations.

Note icons are used to present additional helpful material related to the subject being discussed.

Important information about potential mistakes or hazards is highlighted with a Caution icon.

Each step-by-step Hands-on Project is marked by the Hands-on icon.

WHERE SHOULD YOU START?

This book is intended to be read in sequence, from beginning to end. Each chapter builds upon those that precede it, to provide a solid understanding of Windows 2000 concepts. After completing the chapters, you may find it useful to go back through the book and use the review questions and projects to solidify this knowledge. Readers are also encouraged to investigate the many pointers to online and printed sources of additional information that are cited throughout this book.

ACKNOWLEDGMENTS

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